



LBL-group meeting

neutrino.lbl.gov/~snoman/currat/talks/

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LBNL

April 27, 2004

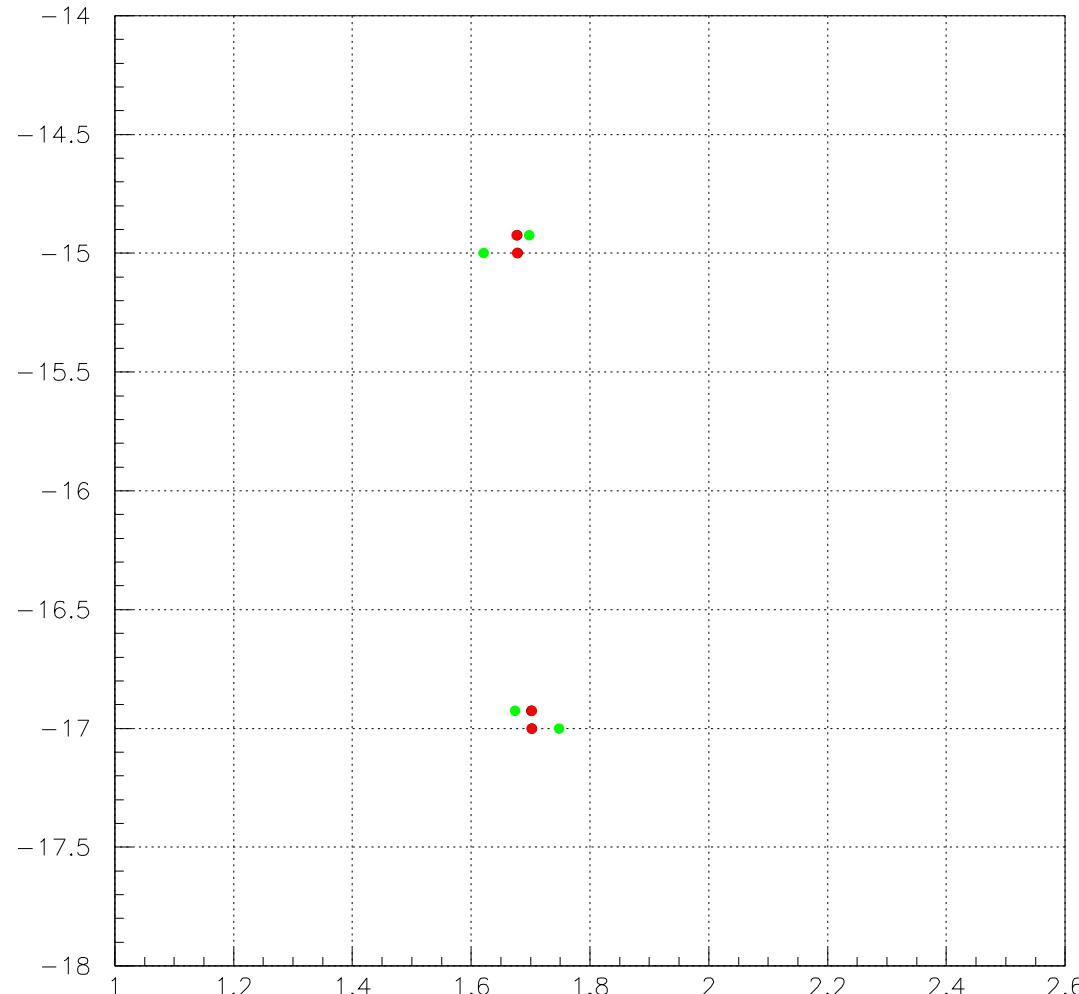
- ❖ News from the real chamber ↳ CDF collabo meeting at FNAL this week
- ❖ Update on the muon chamber(s) toy MC



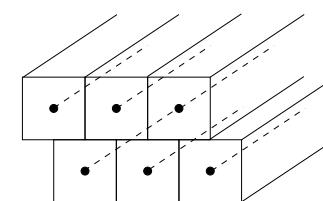
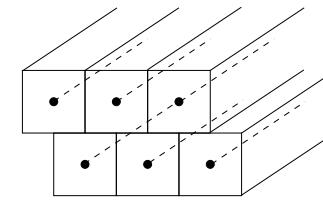
Muon chamber toy MC



Implemented 7.5×7.5 cm² drift cells, 4 layers w/overlap. Mirror hits in green.



- ◆ $\sigma_T \simeq 500 \mu\text{m}$
 - ◆ $\sigma_{long} \simeq 5 \text{ mm}$
 - ◆ $\epsilon_{det} \simeq 0.9$ per tube
 - ◆ No mult. scat.



Detection efficiency

Detection efficiency ϵ (i.e. per tube) will probably not cause the biggest issue (assuming 4 active layers):

Case $\epsilon = 0.9$

all 4 hits	65.6%
3 hits	29.2%
2 hits	4.9%
1 hit	0.4%

Case $\epsilon = 0.8$

all 4 hits	41.0%
3 hits	40.8%
2 hits	15.4%
1 hit	2.6%

Case $\epsilon = 0.7$

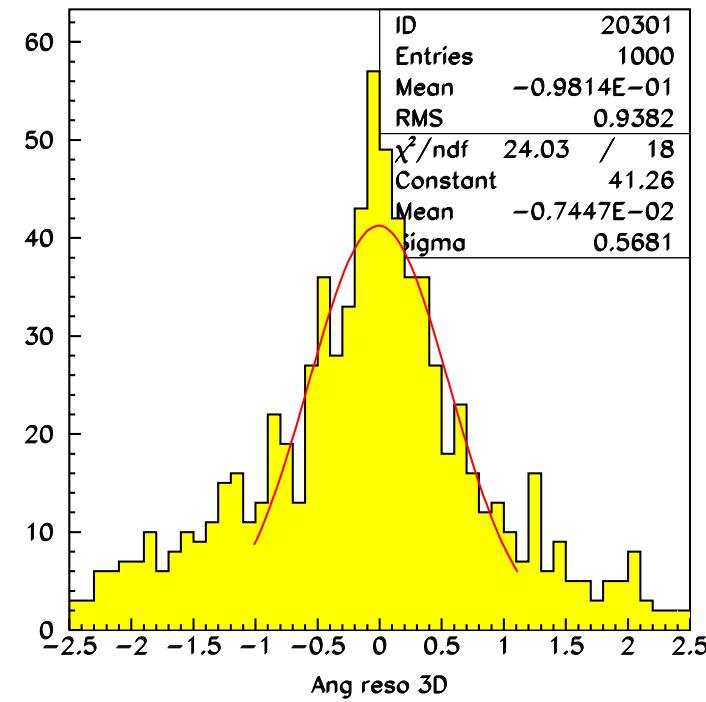
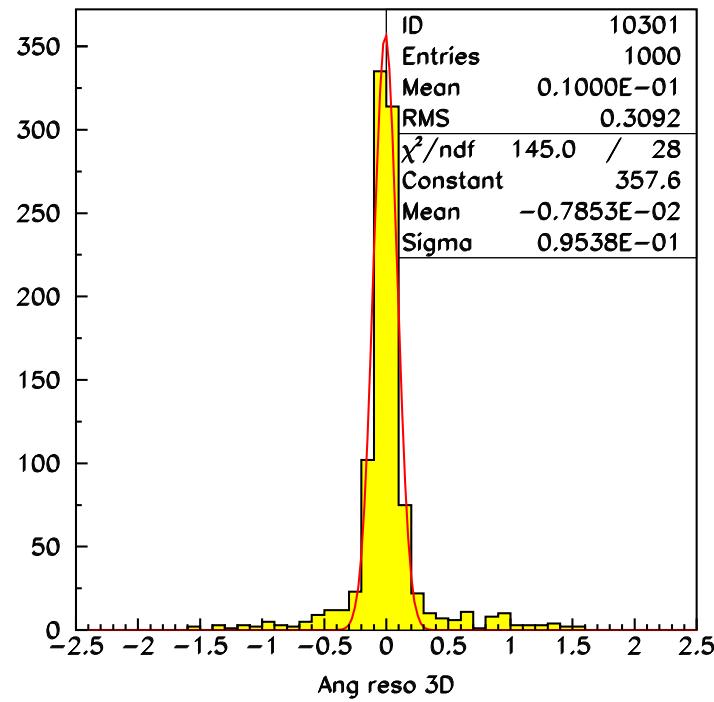
all 4 hits	24.0%
3 hits	30.9%
2 hits	26.4%
1 hit	7.6%

Case $\epsilon = 0.6$

all 4 hits	13.0%
3 hits	34.6%
2 hits	34.6%
1 hit	15.3%

Angular resolution 3D

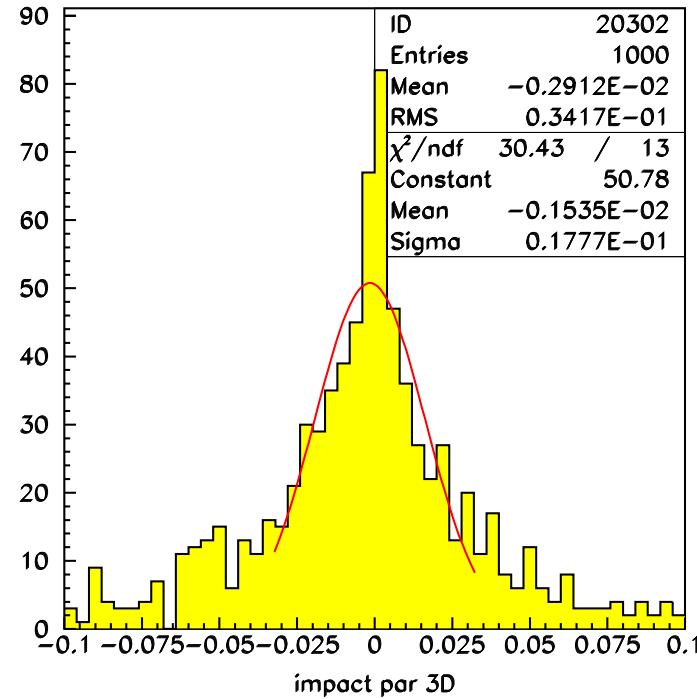
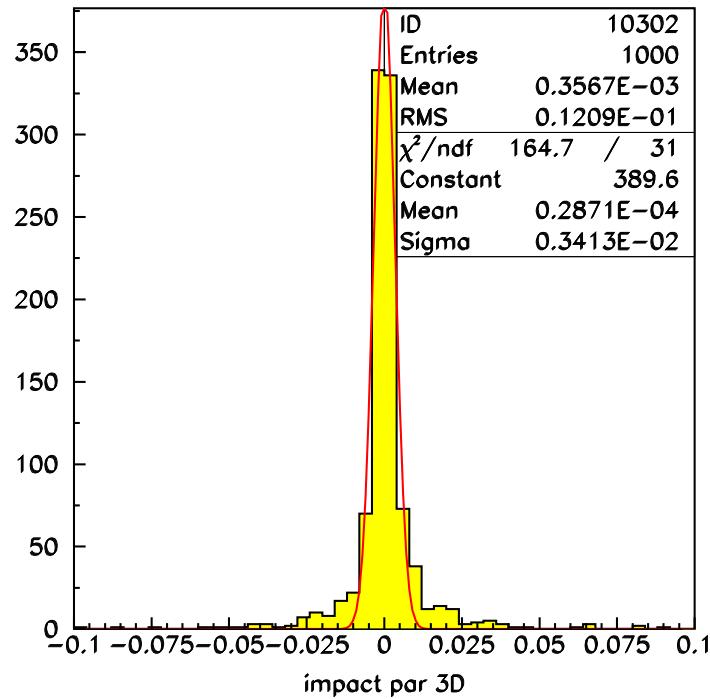
- ❖ Realisitic reconstruction (Hough transform \oplus least squares, iterated)
- ❖ Testing out 2 configurations: (*Left*): 2 chambers of 2 layers each (2 m apart) vs (*Right*): 1 chamber of 4 layers. Units are [degree]
- ❖ Entries: 2 weeks worth of data (4 years available)



Impact parameter 3D

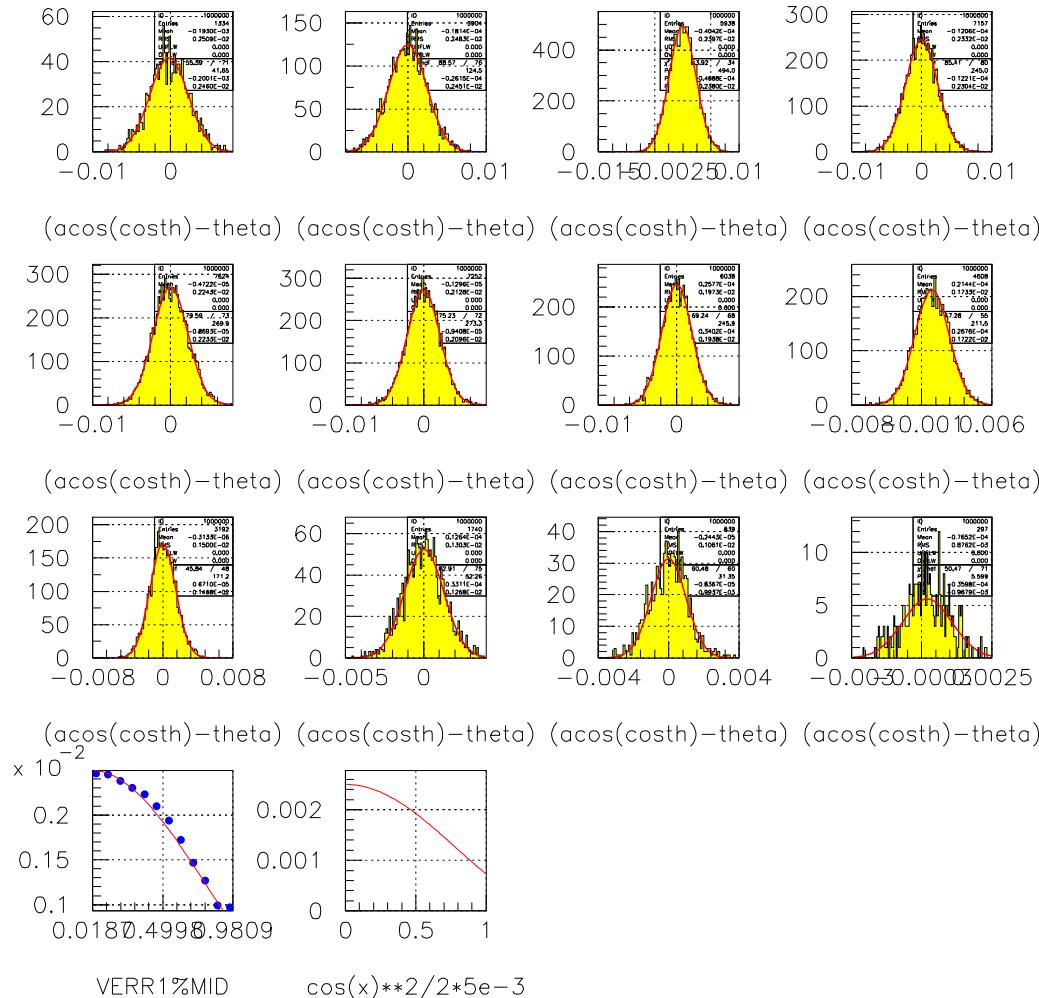
- ◆ Testing out 2 configurations: (*Left*): 2 chambers of 2 layers each (2 m apart) vs (*Right*): 1 chamber of 4 layers.
- ◆ Flux studies remain to be done f(high ρ), f(chamber size)

$$(\rho_{gen} - \rho_{rec})/\rho_{gen}$$



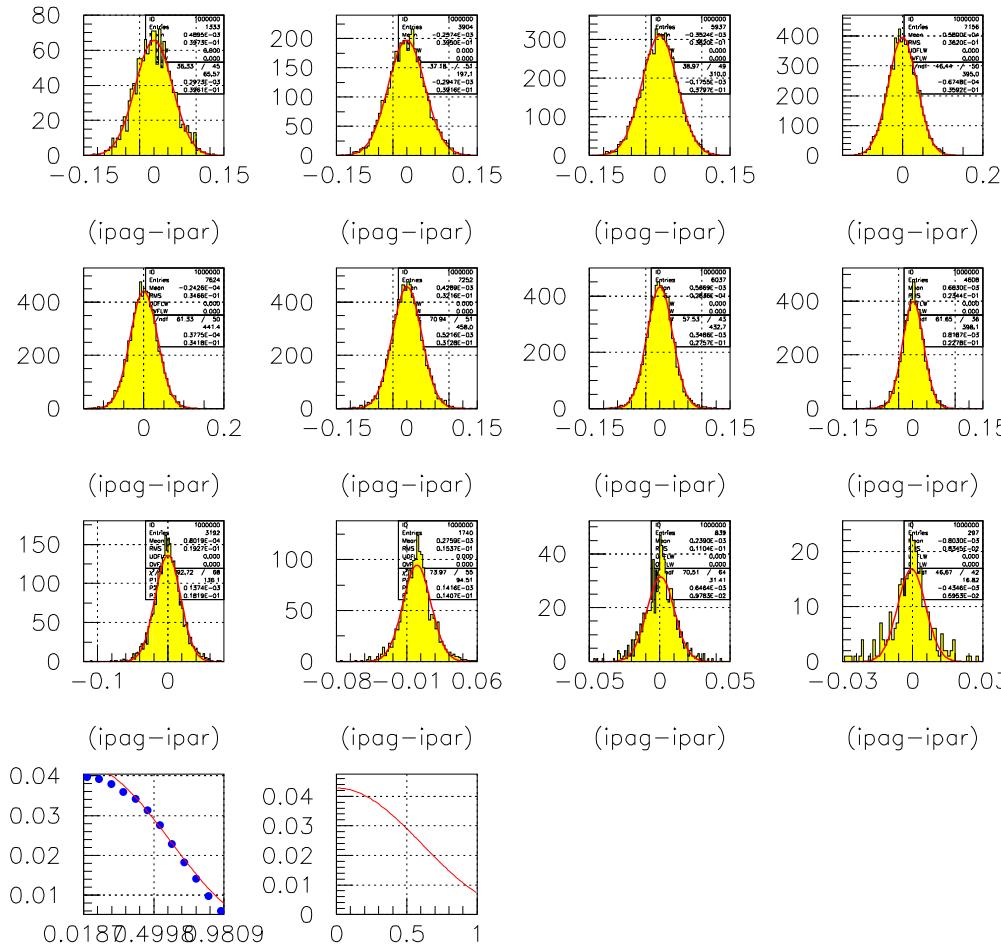
Validating the simulation and the error propagation. Reconstructed direction error $\sigma_\theta = \sigma_\theta(\theta)$

$$\sigma_\theta(\theta) = \cos^2 \theta \cdot \frac{1}{\Delta H} \cdot \sigma_x$$



Validating the simulation and the error propagation. Reconstructed impact parameter error $\sigma_\rho = \sigma_\rho(\hat{\rho}, \theta)$

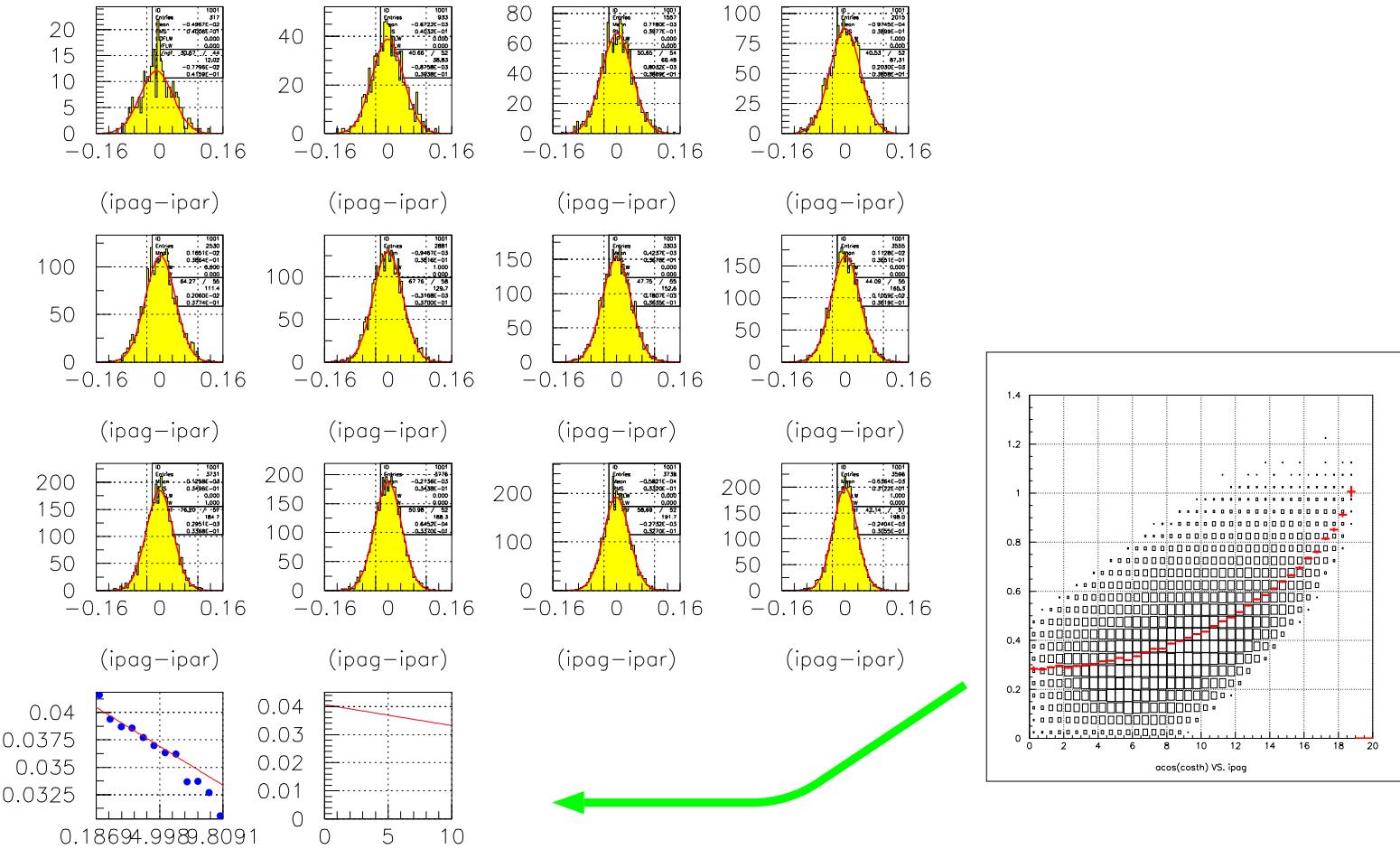
$$\sigma_\rho^2(\rho, \theta) = \cos^4 \theta \cdot (\cos \theta - \frac{x(\rho)}{H} \cdot \sin \theta)^2 \cdot (\frac{H}{\Delta H})^2 \cdot \sigma_x^2 + \cos^2 \theta \cdot \sigma_x^2$$



$$\text{sqrt}(((\cos(\theta)^2 * \sin(\theta) / 17 * \sin(x) * \cos(x)^2 * 17/2)^{1/2} + \cos(x)^2) * 5e-3)$$

Validating the simulation and the error propagation. Reconstructed impact parameter error $\sigma_\rho = \sigma_\rho(\rho, \hat{\theta})$

$$\sigma_\rho^2(\rho, \theta) = \cos^4 \theta \cdot (\cos \theta - \frac{x(\rho)}{H} \cdot \sin \theta)^2 \cdot (\frac{H}{\Delta H})^2 \cdot \sigma_x^2 + \cos^2 \theta \cdot \sigma_x^2$$



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'cos(0.6883*(dn)(0.32)(17)/17*sin(0.32)*cos(0.32)**2)*17/2*5e-3)**2+cos(0.32)**2*(5e-3)*>
```